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Effect of Molybdenum and Boron on increasing alfalfa seed yield

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Key words : alfalfa , microelement , borax , ammonium molybdate , seed yield

Introduction Although the content of microelements is low in plants , they play a role in translocation and energy exchange in metabolism , and have an important influence on crop yield (Guoxiao ,etc . ,2006 ;Chang Yao-hong ,2007 ; Hu Ai-tang ,2003) . Different concentrations of borax and ammonium molybdate were sprayed at early florescence ,squaring , and florescence of alfalfa in this study , and the effect of boron and molybdenum on yield of alfalfa seed was measured .

Experimental area survey The experimental area is located in the grassland research station ,Hutubi ,Xinjiang .E :86°7′ , N :44°8′ , H :0 .446km . Annual precipitation is 161 .3 mm , annual evaporation is 2312 .7mm ,average humidity is 54% during growing season , the annual accumulated temperature over or equal to 10℃ is 3561 .3 , the frost-free period is 173 days . The total salt content of the research area in 0～20cm is more than 1 .5% ,and pH is more than 8 .5 .

Materials and methods Test materials are Xinmu No .1 Variegated Alfalfa , borax (the boron content is 11%) , ammonium molybdate(the molybdenum content is 5 4%) .

The treatments were foliar sprays of borax at 0 .4% , 0 .6% and 0 .8% , ammonium molybdate at 0 .05% , 0 .07% and 0 .09% , and normal water . There were sprayed during early florescence , squaring period and florescence , respectively . The size of plots were $10m^2$. Each treatment was repeated three times in a randomized block design .

The following was measured on 10 plants : plant height , growth rate , branch numbers , the number of racemes , the pod numbers per inflorescence , the seed setting number in each pod after regrowth , and seed yield , 1000-grain weight , germination rate after harvest seed .

Table 1 *The effects of boron and molybdenum on alfalfa seed yield and yield components .*

treatment	1000-grain weight (g)	the number of branches (m^2)	pod / inflorescence(a)	inflorescence / branches (a)	seeds / pods(a)	seed yield (kg/hm^2)
Ammonium Molybdate0 .05%	1 .900±0 .0262	421 .66±30 .1	15 .53±0 .68	15 .13±1 .5	5 .97±0 .20	592 .31±65 .2
Ammonium Molybdate 0 .07%	2 .052±0 .0258	392 .33±25 .6	14 .23±0 .70	14 .36±1 .6	5 .00±0 .23	513 .3±70 .8
Ammonium Molybdate 0 .09%	1 .899±0 .0203	388 .67±23 .6	11 .66±0 .42	13 .36±2 .0	5 .20±0 .27	408 .00±42 .9
borax 0 .4%	1 .872±0 .0199	472 .67±45 .1	15 .26±1 .1	11 .26±1 .2	5 .77±0 .21	471 .00 ±68 .5
borax0 .6%	1 .900±0 .0234	484 .00±33 .5	13 .8±0 .90	12 .1 ± 1 .2	5 .37±0 .22	492 .00±73 .2
borax 0 .8%	1 .900±0 .0123	492 .00±50 .1	16 .3±1 .3	13 .46±1 .3	5 .73±0 .26	507 .00±68 .6
ck	1 .944±0 .0244	380 .00±32 .6	10 .06±0 .51	16 .66±2 .2	4 .40±0 .19	438 .75 ±61 .4

Results and discussion The results showed that alfalfa seed yield ,branch numbers , the pod numbers per inflorescence and the seed setting number in each pod were higher than in the control after spraying boron and molybdenum . When 0 .05% ammonium molybdate was sprayed , the yield increased 35% compared to the control . Branch numbers , the pod numbers per inflorescence and the seed setting number in each pod increased 10 .96 % , 54 .37% , 35 .68% ($p<0.05$) , respectively . When 0 .8% borax was sprayed , the yield increased 15 .56% relative to the control .Branch numbers , the pod numbers per inflorescence and the seed setting number in each pod also increased($p<0.05$) . When 0 .07% ammonium molybdate was sprayed , thousand-grain weight increased 5 .6% compared to the control . After the different concentrations of borax and ammonium molybdate were sprayed , the numbers of racemes per reproductive branch were lower than that in the control .

The effect of boron and molybdenum on increasing yield of alfalfa seed is evident from this study . With increasing concentrations of Ammonium Molybdate , the seed production decreased gradually , and seed production increased with increasing concentrations of borax . Various factors related to the formation of seed production were affected , especially inflorescences per pod and per pod seed of alfalfa .